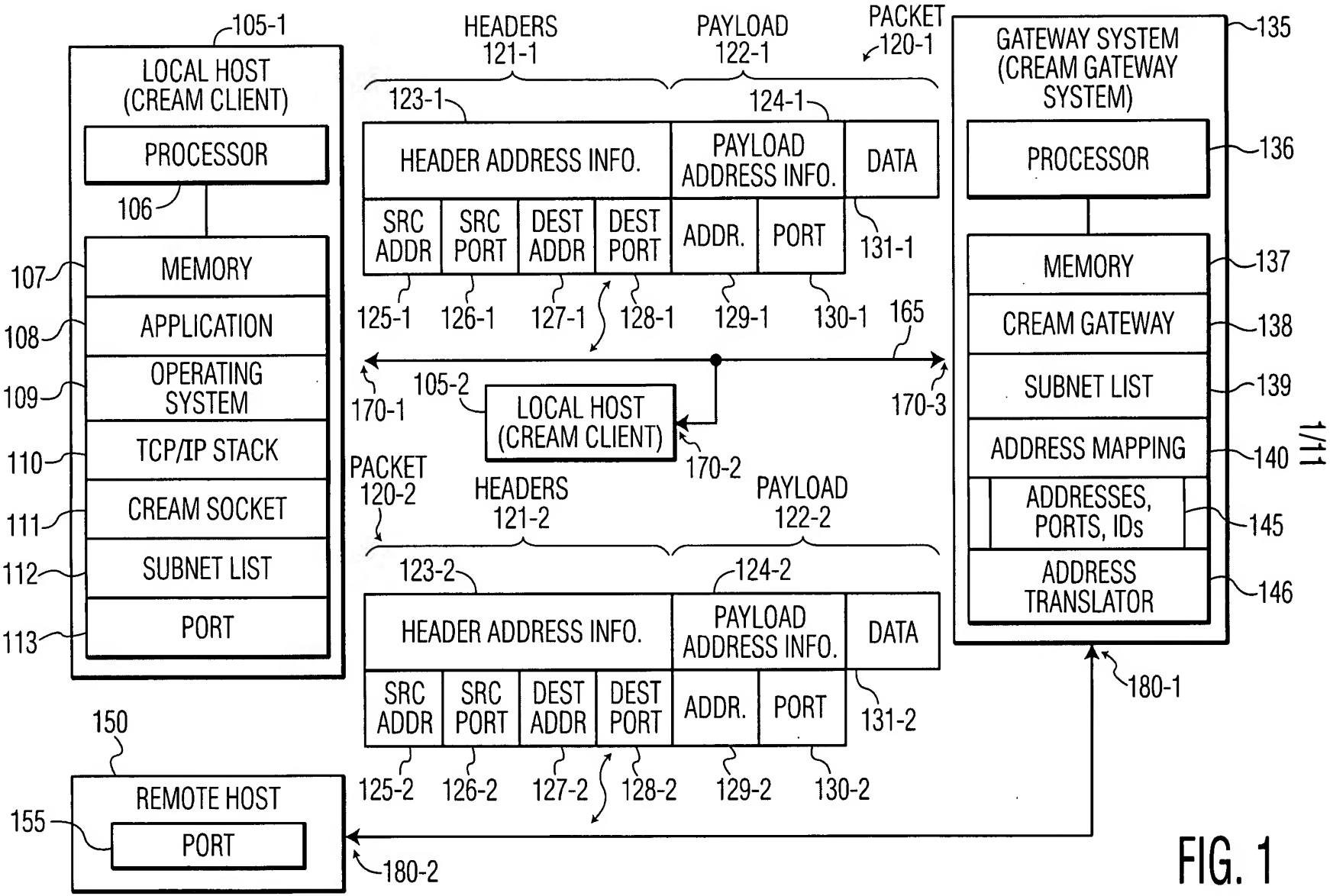
105-1
LOCAL HOST
(CREAM CLIENT)
PROCESSOR
106
MEMORY
APPLICATION
OPERATING SYSTEM
TCP/IP STACK
CREAM SOCKET
SUBNET LIST
PORT
107
108
109
110
111
112
113
HEADERS
121-1
PAYLOAD
122-1
PACKET
120-1
123-1
124-1
HEADER ADDRESS INFO.
PAYLOAD ADDRESS INFO.
DATA
SRC ADDR
SRC PORT
DEST ADDR
DEST PORT
ADDR.
PORT
131-1
125-1
126-1
127-1
128-1
129-1
130-1
165
170-1
105-2
LOCAL HOST
(CREAM CLIENT)
170-2
170-3
PACKET
120-2
HEADERS
121-2
PAYLOAD
122-2
123-2
124-2
HEADER ADDRESS INFO.
PAYLOAD ADDRESS INFO.
DATA
SRC ADDR
SRC PORT
DEST ADDR
DEST PORT
ADDR.
PORT
131-2
125-2
126-2
127-2
128-2
129-2
130-2
150
REMOTE HOST
PORT
155
180-2
GATEWAY SYSTEM
(CREAM GATEWAY
SYSTEM)
135
PROCESSOR
136
MEMORY
137
CREAM GATEWAY
138
SUBNET LIST
139
ADDRESS MAPPING
140
ADDRESSES, PORTS, IDs
145
ADDRESS TRANSLATOR
146
180-1

FIG. 1

SENDER	ADDRESSES INCLUDED BY SENDER	ADDRESS CHANGES BY GATEWAY	ADDRESS RECEIVED BY RECEIVER	RECEIVER
IN-HOME HOST	SOURCE IP = LOCAL IP ADDRESS OF IN-HOME HOST; SOURCE PORT = CREAM NEGOTIATED PORT; DESTINATION IP = PUBLIC IP ADDRESS OF HOST IN INTERNET; DESTINATION PORT = PORT OF HOST IN INTERNET	SOURCE IP BY PUBLIC IP ADDRESS OF 'GATEWAY'; THE SOURCE PORT REMAINS UNCHANGED (E.G., ALREADY NEGOTIATED)	SOURCE IP = PUBLIC IP OF 'GATEWAY'; SOURCE PORT = CREAM NEGOTIATED PORT; DESTINATION IP = ITS OWN IP ADDRESS; DESTINATION PORT = PORT OF RECEIVING SOCKET.	HOST IN INTERNET
HOST IN INTERNET	SOURCE IP = PUBLIC IP ADDRESS OF HOST IN INTERNET; SOURCE PORT = PORT OF HOST IN INTERNET; DESTINATION IP = PUBLIC IP ADDRESS OF 'GATEWAY,' MASQUERADING AS IN-HOME HOST; DESTINATION PORT = PORT OF GATEWAY	DESTINATION IP ADDRESS TO LOCAL ADDRESS OF IN-HOME HOST; DESTINATION PORT REMAINS UNCHANGED (E.G., ALREADY NEGOTIATED)	SOURCE IP = PUBLIC IP ADDRESS OF HOST IN INTERNET; SOURCE PORT = PORT OF HOST IN INTERNET; DESTINATION IP = LOCAL IP ADDRESS OF IN-HOME HOST; DESTINATION PORT = NEGOTIATED PORT (UNCHANGED)	IN-HOME HOST

FIG. 2

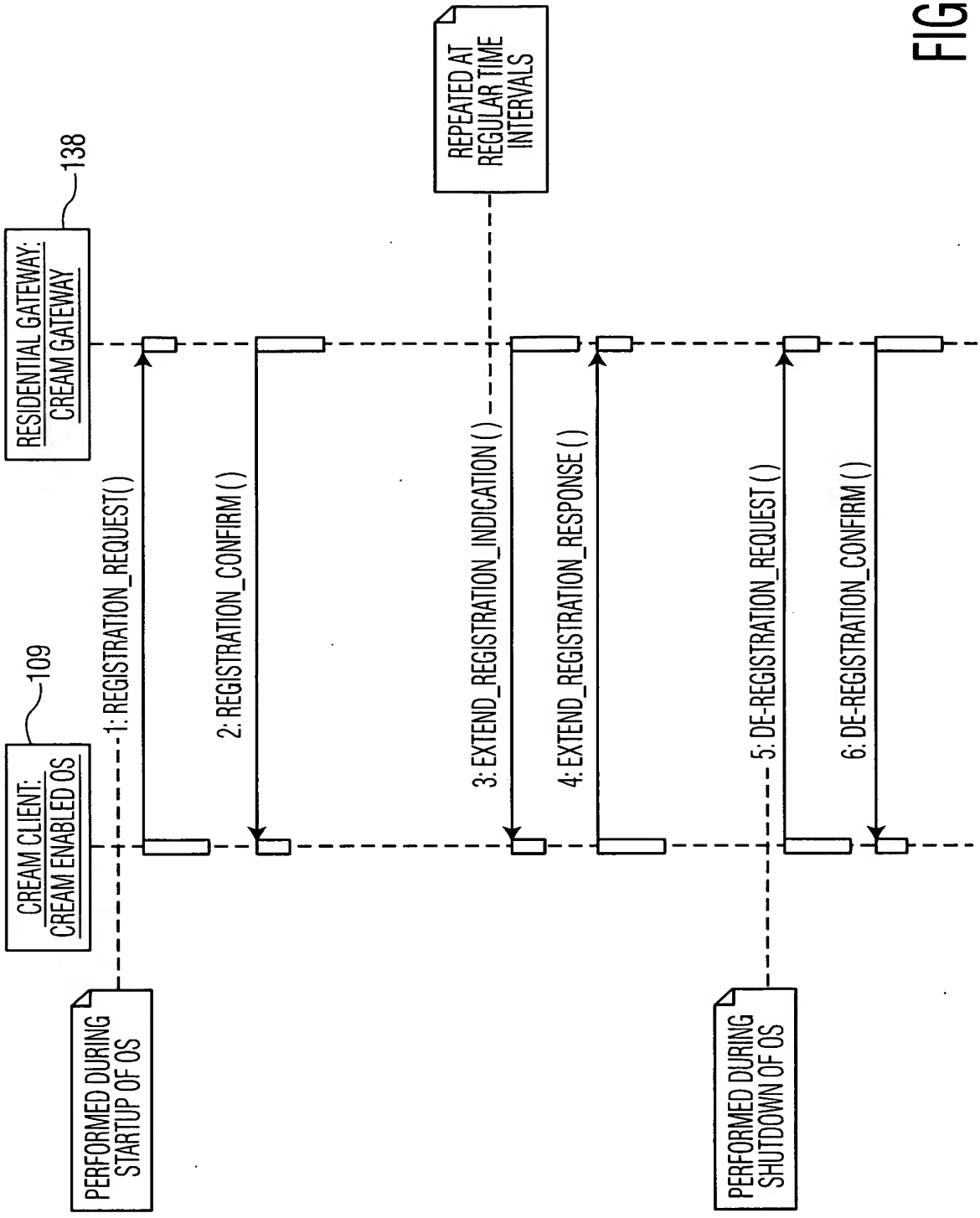
RESIDENTIAL GATEWAY: CREAM GATEWAY
138
CREAM CLIENT: CREAM ENABLED OS
109
REPEATED AT REGULAR TIME INTERVALS
1: REGISTRATION_REQUEST( )
2: REGISTRATION_CONFIRM( )
3: EXTEND_REGISTRATION_INDICATION( )
4: EXTEND_REGISTRATION_RESPONSE( )
5: DE-REGISTRATION_REQUEST( )
6: DE-REGISTRATION_CONFIRM( )
PERFORMED DURING STARTUP OF OS
PERFORMED DURING SHUTDOWN OF OS

FIG. 3

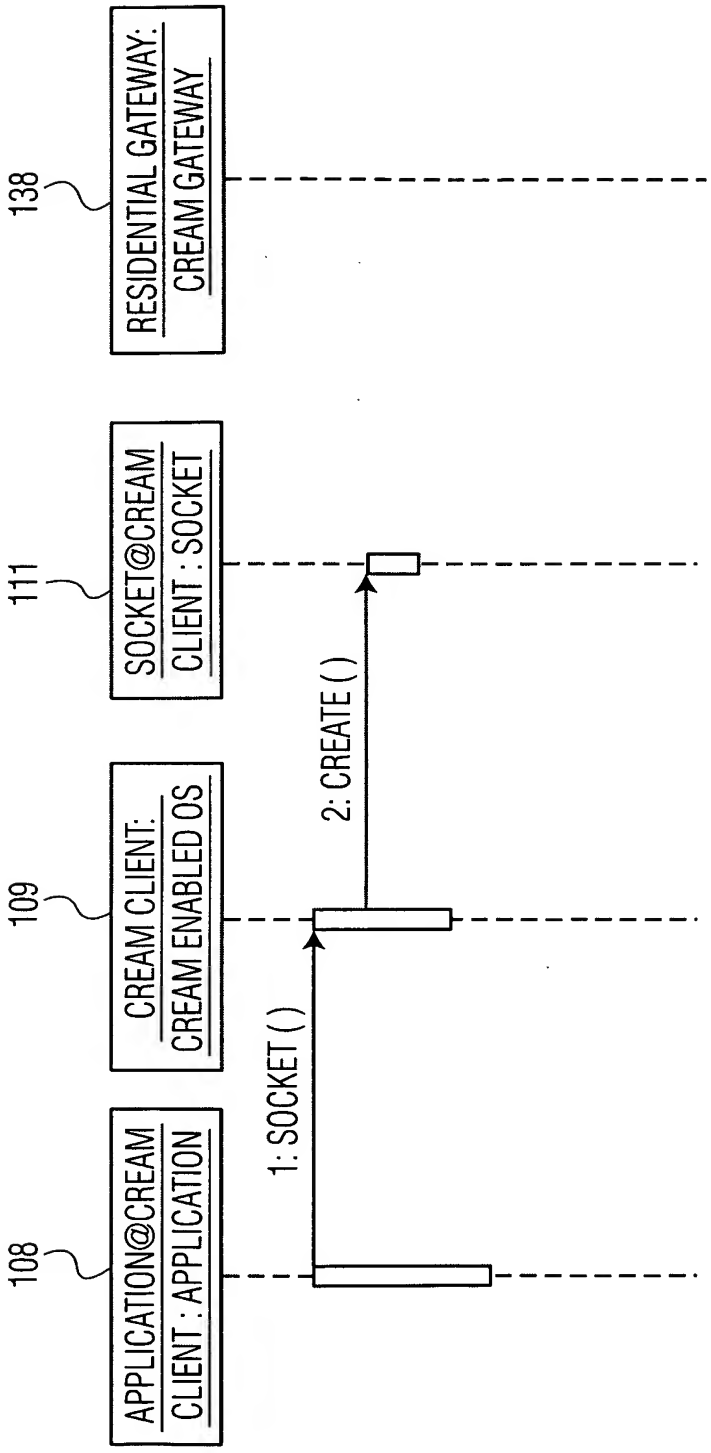
APPLICATION@CREAM
CLIENT : APPLICATION
108
CREAM CLIENT:
CREAM ENABLED OS
109
SOCKET@CREAM
CLIENT : SOCKET
111
RESIDENTIAL GATEWAY:
CREAM GATEWAY
138
1: SOCKET ( )
2: CREATE ( )

FIG. 4

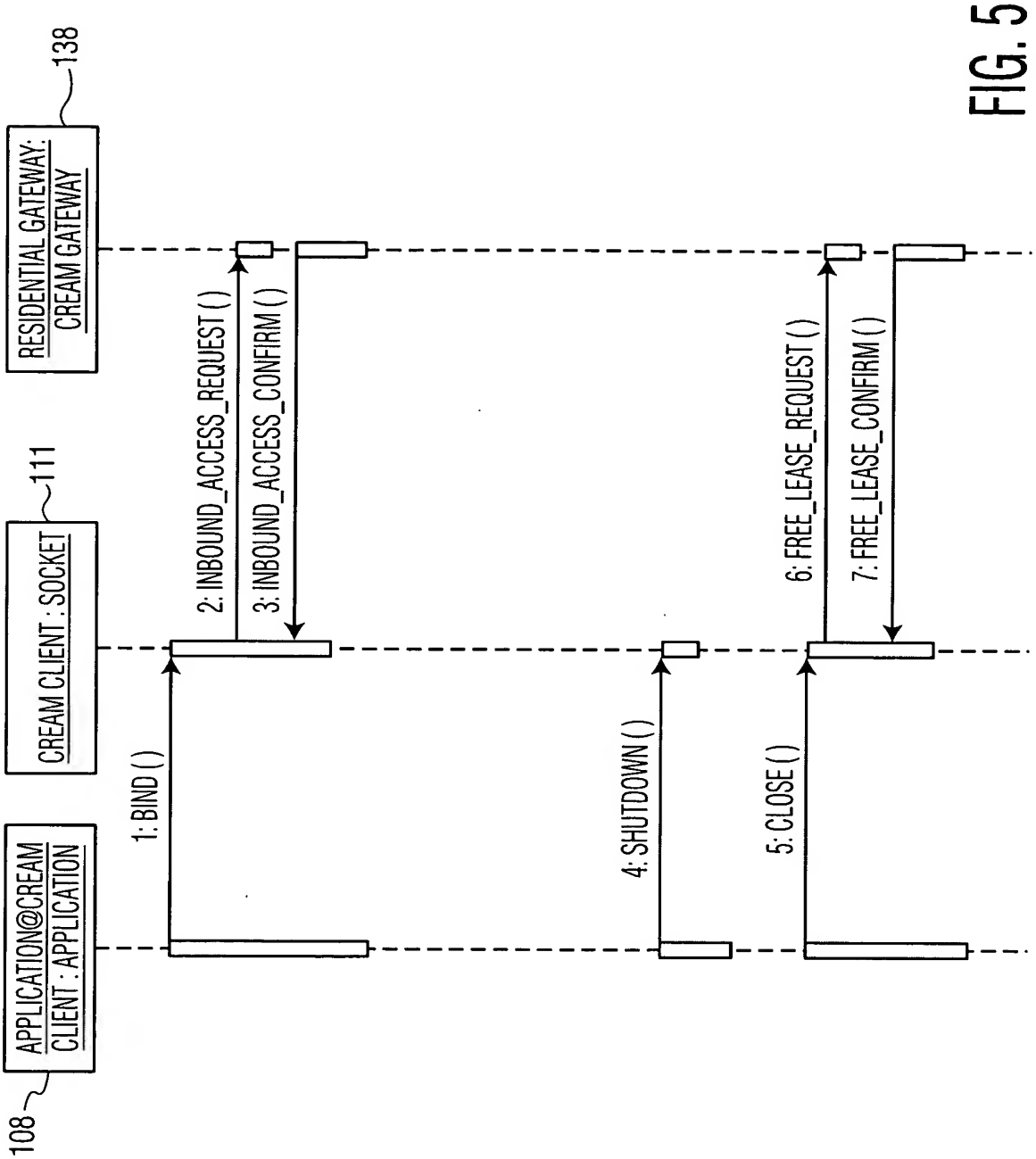
APPLICATION@CREAM CLIENT : APPLICATION
108
CREAM CLIENT : SOCKET
111
RESIDENTIAL GATEWAY: CREAM GATEWAY
138
1: BIND ( )
2: INBOUND_ACCESS_REQUEST ( )
3: INBOUND_ACCESS_CONFIRM ( )
4: SHUTDOWN ( )
5: CLOSE ( )
6: FREE_LEASE_REQUEST ( )
7: FREE_LEASE_CONFIRM ( )

FIG. 5

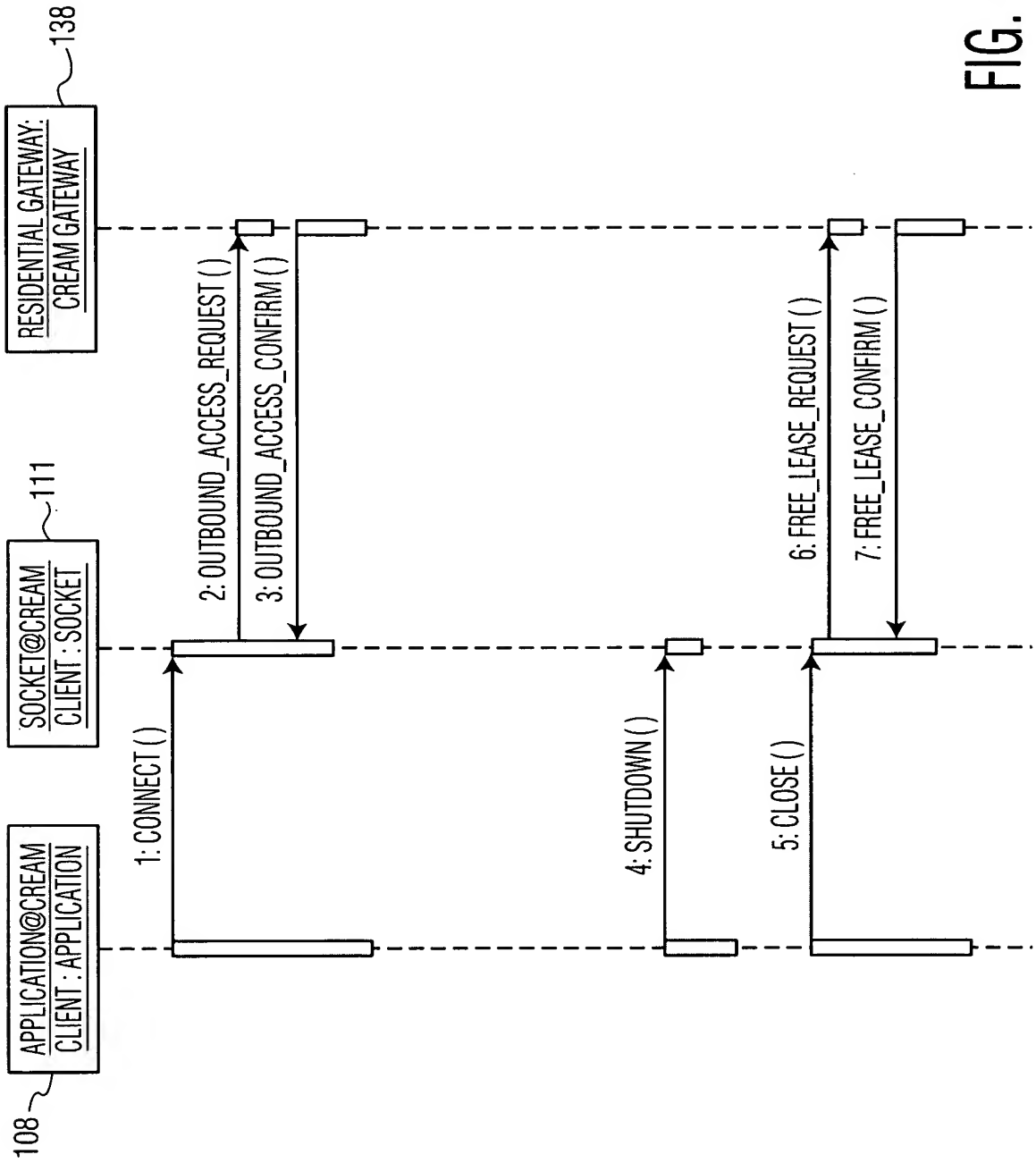
RESIDENTIAL GATEWAY:
CREAM GATEWAY
138
SOCKET@CREAM
CLIENT : SOCKET
111
APPLICATION@CREAM
CLIENT : APPLICATION
108
1: CONNECT ( )
2: OUTBOUND_ACCESS_REQUEST ( )
3: OUTBOUND_ACCESS_CONFIRM ( )
4: SHUTDOWN ( )
5: CLOSE ( )
6: FREE_LEASE_REQUEST ( )
7: FREE_LEASE_CONFIRM ( )

FIG. 6

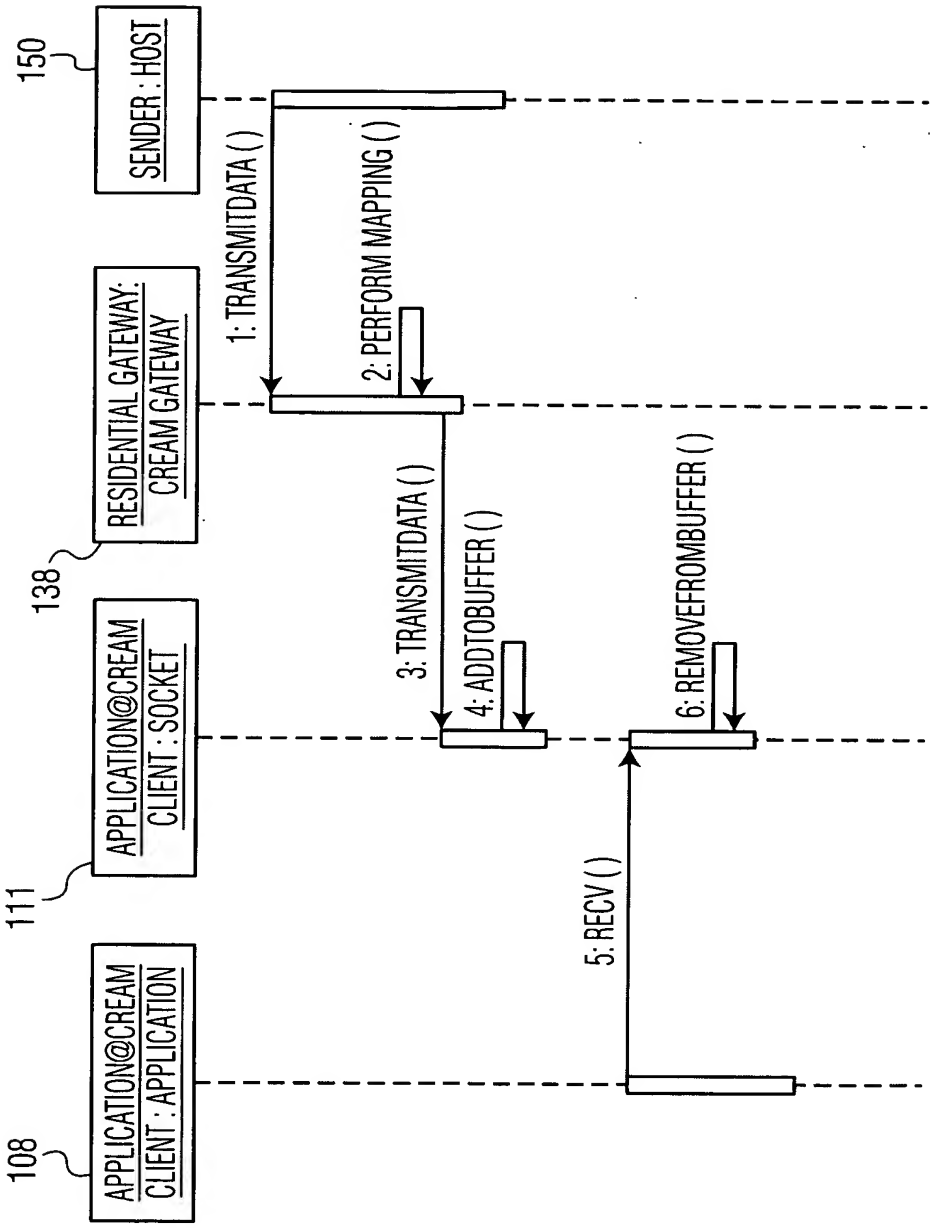
150
SENDER : HOST
1: TRANSMITDATA ( )
2: PERFORM MAPPING ( )
138
RESIDENTIAL GATEWAY:
CREAM GATEWAY
3: TRANSMITDATA ( )
4: ADDTOBUFFER ( )
6: REMOVEFROMBUFFER ( )
111
APPLICATION@CREAM
CLIENT : SOCKET
5: RECV ( )
108
APPLICATION@CREAM
CLIENT : APPLICATION

FIG. 7

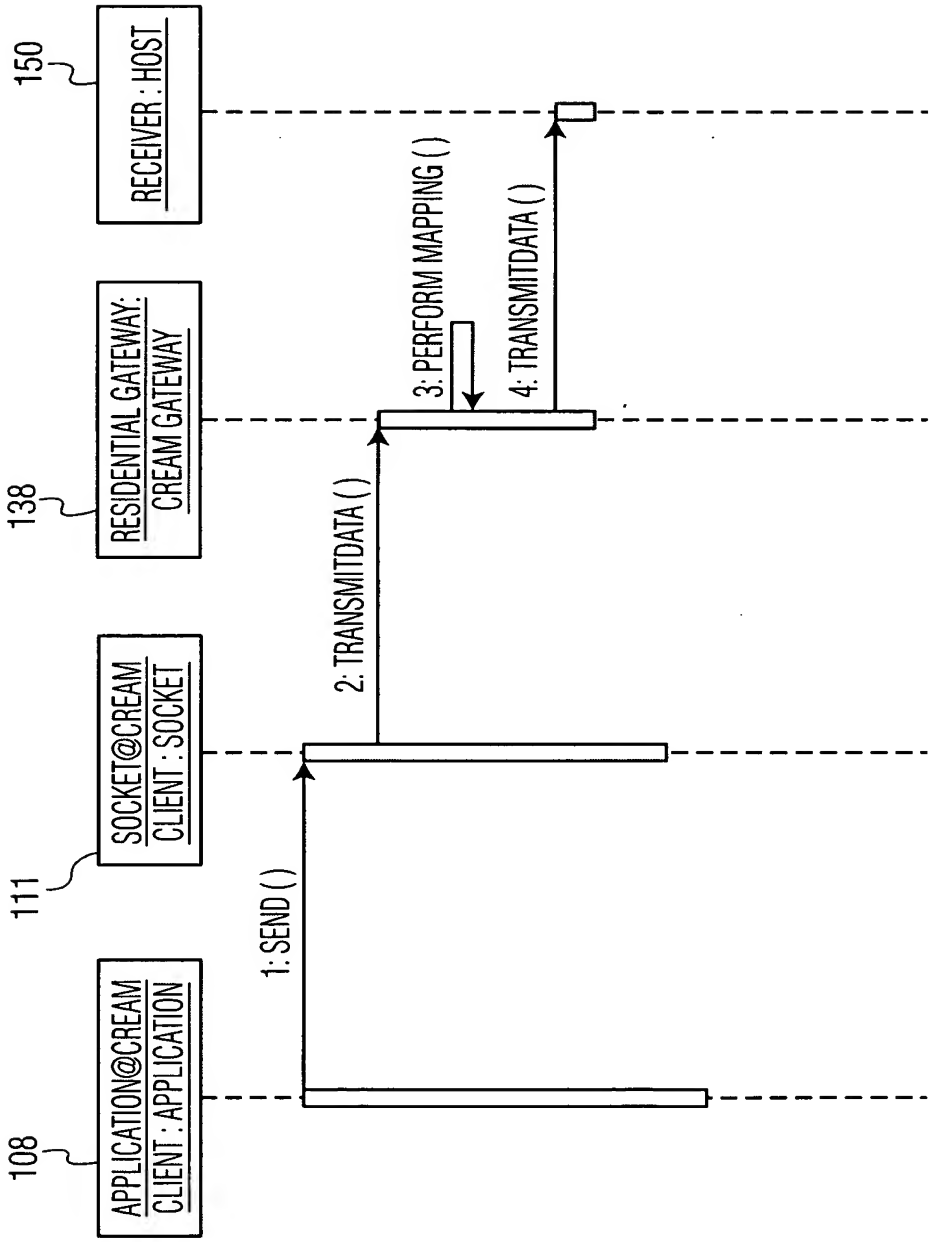
APPLICATION@CREAM
CLIENT : APPLICATION
108
SOCKET@CREAM
CLIENT : SOCKET
111
RESIDENTIAL GATEWAY:
CREAM GATEWAY
138
RECEIVER : HOST
150
1: SEND ( )
2: TRANSMITDATA ( )
3: PERFORM MAPPING ( )
4: TRANSMITDATA ( )

FIG. 8

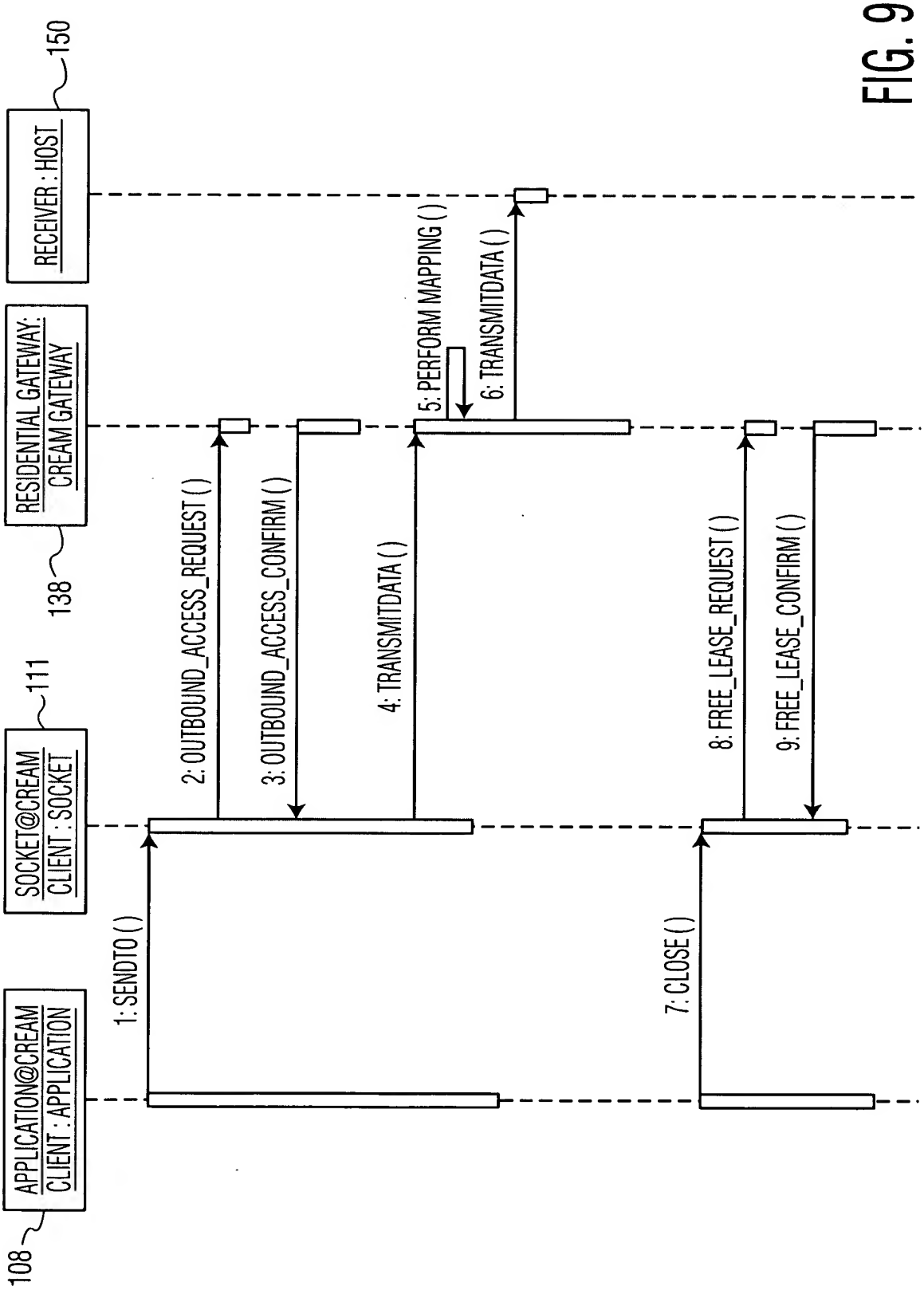
APPLICATION@CREAM
CLIENT : APPLICATION
108
SOCKET@CREAM
CLIENT : SOCKET
111
RESIDENTIAL GATEWAY:
CREAM GATEWAY
138
RECEIVER : HOST
150
1: SENDTO ( )
2: OUTBOUND_ACCESS_REQUEST ( )
3: OUTBOUND_ACCESS_CONFIRM ( )
4: TRANSMITDATA ( )
5: PERFORM MAPPING ( )
6: TRANSMITDATA ( )
7: CLOSE ( )
8: FREE_LEASE_REQUEST ( )
9: FREE_LEASE_CONFIRM ( )

FIG. 9

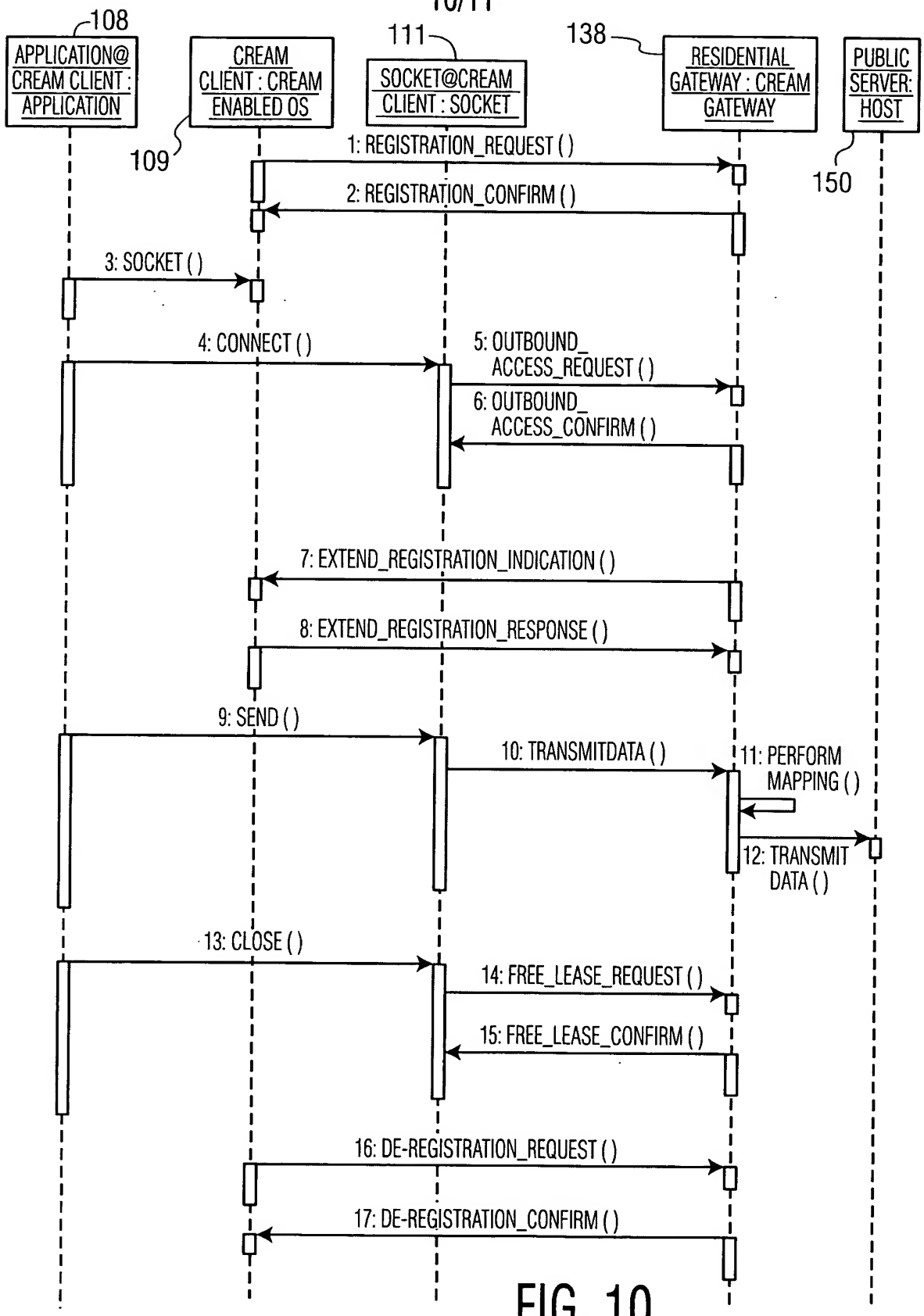
108
APPLICATION@ CREAM CLIENT : APPLICATION
109
CREAM CLIENT : CREAM ENABLED OS
111
SOCKET@CREAM CLIENT : SOCKET
138
RESIDENTIAL GATEWAY : CREAM GATEWAY
150
PUBLIC SERVER: HOST
1: REGISTRATION_REQUEST ( )
2: REGISTRATION_CONFIRM ( )
3: SOCKET ( )
4: CONNECT ( )
5: OUTBOUND_ ACCESS_REQUEST ( )
6: OUTBOUND_ ACCESS_CONFIRM ( )
7: EXTEND_REGISTRATION_INDICATION ( )
8: EXTEND_REGISTRATION_RESPONSE ( )
9: SEND ( )
10: TRANSMITDATA ( )
11: PERFORM MAPPING ( )
12: TRANSMIT DATA ( )
13: CLOSE ( )
14: FREE_LEASE_REQUEST ( )
15: FREE_LEASE_CONFIRM ( )
16: DE-REGISTRATION_REQUEST ( )
17: DE-REGISTRATION_CONFIRM ( )

FIG. 10

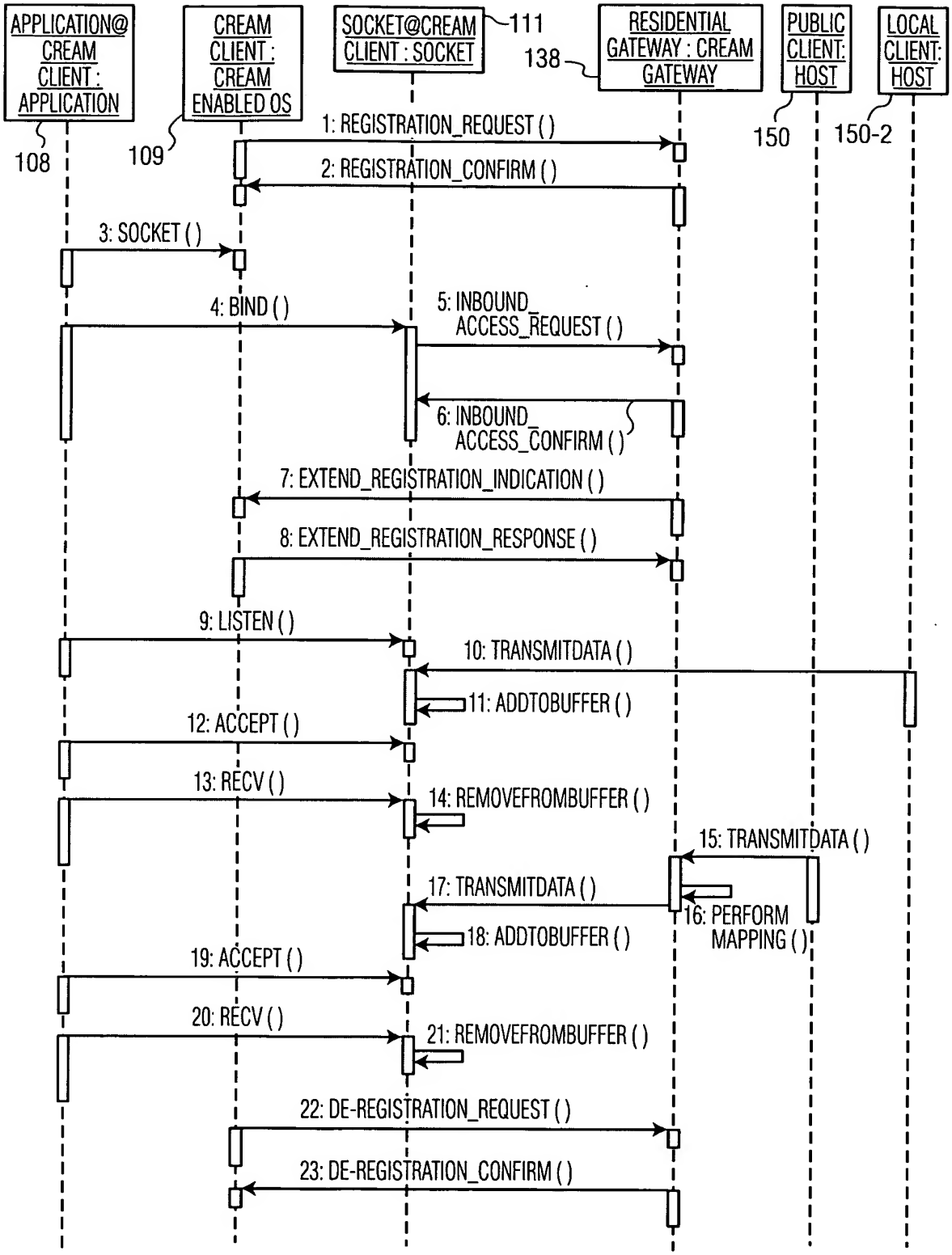
APPLICATION@ CREAM CLIENT : APPLICATION
CREAM CLIENT : CREAM ENABLED OS
SOCKET@CREAM CLIENT : SOCKET
111
RESIDENTIAL GATEWAY : CREAM GATEWAY
138
PUBLIC CLIENT: HOST
LOCAL CLIENT: HOST
108
109
150
150-2
1: REGISTRATION_REQUEST ( )
2: REGISTRATION_CONFIRM ( )
3: SOCKET ( )
4: BIND ( )
5: INBOUND_ ACCESS_REQUEST ( )
6: INBOUND_ ACCESS_CONFIRM ( )
7: EXTEND_REGISTRATION_INDICATION ( )
8: EXTEND_REGISTRATION_RESPONSE ( )
9: LISTEN ( )
10: TRANSMITDATA ( )
11: ADDTOBUFFER ( )
12: ACCEPT ( )
13: RECV ( )
14: REMOVEFROMBUFFER ( )
15: TRANSMITDATA ( )
16: PERFORM MAPPING ( )
17: TRANSMITDATA ( )
18: ADDTOBUFFER ( )
19: ACCEPT ( )
20: RECV ( )
21: REMOVEFROMBUFFER ( )
22: DE-REGISTRATION_REQUEST ( )
23: DE-REGISTRATION_CONFIRM ( )

FIG. 11